Amendment to the Claims

In the Claims:

Please add new Claim 70, as indicated below.

1. (Previously Presented) An integrated thermal treatment system for treating a fluid, comprising:

(a) a plurality of untreated fluid channels that convey an untreated fluid into the thermal treatment system;

(b) a plurality of treated fluid channels that convey a treated fluid out from the thermal treatment system and which are disposed in an alternating relationship with the plurality of untreated fluid channels, such that thermal energy is readily exchanged between the untreated fluid flowing within said plurality of untreated fluid channels and the treated fluid flowing within said plurality of treated fluid channels;

(c) at least one fluid inlet in fluid communication with said plurality of untreated fluid channels;

(d) at least one fluid outlet in fluid communication with said plurality of treated fluid channels; and

(e) a stacked plate heat exchanger portion comprising:

(i) a plurality of sheets stacked together and separated so that a gap is defined between adjacent sheets, each gap comprising one of said plurality of untreated fluid channels and said plurality of treated fluid channels, such that successive gaps comprise alternating untreated fluid channels and treated fluid channels; and

(ii) a thermal treatment zone disposed within the stacked plate heat exchanger, said thermal treatment zone comprising means for thermally treating a fluid, said thermal treatment zone being in fluid communication with each untreated fluid channel and with each treated fluid channel.

2. (Original) The thermal treatment system of Claim 1, further comprising an insulated housing that substantially encloses said plurality of untreated fluid channels, said plurality of treated fluid channels, and said thermal treatment zone, thereby substantially reducing thermal energy exchanged between said thermal treatment system and an environment external to said thermal treatment system.

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3. (Original) The thermal treatment system of Claim 2, wherein said insulated housing comprises a plurality of aerogel panels.

4. (Original) The thermal treatment system of Claim 1, further comprising a catalytic treatment zone disposed adjacent to said thermal treatment zone and within at least one of each of said plurality of untreated fluid channels and each of said plurality of treated fluid channels; and wherein substantial heat provided by said thermal treatment zone facilitates a catalytic conversion by said catalytic treatment zone.

5. (Original) The thermal treatment system of Claim 4, wherein said catalytic treatment zone comprises a noble metal catalyst that reduces a temperature required to oxidize an organic chemical contaminant entrained within the untreated fluid.

6. (Original) The thermal treatment system of Claim 5, wherein said thermal treatment zone is maintained at a temperature in excess of 300 degrees Celsius.

7. (Original) The thermal treatment system of Claim 1, wherein said thermal treatment zone comprises at least one electric resistive heating element.

8. (Original) The thermal treatment system of Claim 1, wherein said thermal treatment zone has an operating temperature in excess of 600 degrees Celsius.

9. (Original) The thermal treatment system of Claim 1, wherein said thermal treatment zone comprises at least one chiller that cools the untreated fluid sufficiently to enable a condensable compound to be condensed and thereby removed from said untreated fluid.

10. (Previously Presented) The thermal treatment system of Claim 1, wherein each of the plurality of sheets includes at least one orifice, the thermal treatment zone being disposed within the orifices in the sheets.

11. (Original) The thermal treatment system of Claim 10, wherein each of said plurality of sheets comprises a metal foil.

Claims 12-31 (Previously Cancelled)

32. (Original) Apparatus for thermally treating a fluid, including an integrated heat exchanger and thermal treatment zone, said apparatus comprising:

(a) a plurality of untreated fluid channels that convey an untreated fluid into the apparatus;

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(b) a plurality of treated fluid channels that convey a treated fluid from the apparatus and which are disposed in an alternating relationship with the plurality of untreated fluid channels, so that thermal energy is readily transferred to the untreated fluid flowing within said plurality of untreated fluid channels from the treated fluid flowing within said plurality of treated fluid channels;

(c) at least one fluid inlet in fluid communication with said plurality of untreated fluid channels;

(d) at least one fluid outlet in fluid communication with said plurality of treated fluid channels;

(e) a stacked plate heat exchanger portion comprising:

(i) a plurality of sheets stacked together and separated so that a gap is defined between adjacent sheets, each gap comprising one of said plurality of untreated fluid channels and said plurality of treated fluid channels, such that successive gaps comprise alternating untreated fluid channels and treated fluid channels, each sheet having a thickness and a characteristic heat transfer that enables thermal energy to be more readily exchanged between adjacent gaps through a sheet rather than along the sheet, each sheet having at least one orifice disposed such that the orifices of adjacent sheets are in alignment; and

(ii) at least one face of the stacked plate heat exchanger being in fluid communication with a source of untreated fluid and a volume into which treated fluid is discharged, said at least one face being disposed along an edge of each sheet;

(f) a thermal treatment zone portion disposed within the orifices in the sheets, said thermal treatment zone comprising means for thermally treating a fluid, said thermal treatment zone being in fluid communication with each untreated fluid channel and with each treated fluid channel;

(g) means for enabling a flow of fluid through said apparatus; and

(h) at least one cross-flow header disposed adjacent to said at least one face of said stacked plate heat exchanger, said at least one cross-flow header being in fluid communication with said means and with one of each untreated fluid channel and each treated fluid channel.

33. (Original) The apparatus of Claim 32, wherein said stacked plate heat exchanger further comprises at least one fluid-blocking structure disposed in each untreated fluid channel and in each treated fluid channel, such that:

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(a) when said at least one cross-flow header is in fluid communication with each untreated fluid channel:

(i) said at least one fluid-blocking structure disposed in each untreated fluid channel prevents the untreated fluid from entering into each untreated fluid channel via said at least one face, and enables the untreated fluid to enter into each untreated fluid channel via said at least one cross-flow header; and

(ii) said at least one fluid-blocking structure disposed in each treated fluid channel prevents a treated fluid from entering into said at least one cross-flow header, and enables treated fluid to exit said apparatus via said at least one face;

(b) when said at least one cross-flow header is in fluid communication with each treated fluid channel:

(i) said at least one fluid-blocking structure disposed in each untreated fluid channel enables an untreated fluid to enter into each untreated fluid channel via said at least one face, and prevents untreated fluid from entering into said at least one cross-flow header; and

(ii) said at least one fluid-blocking structure disposed in each treated fluid channel prevents the treated fluid from exiting said apparatus via said at least one face, and enables the treated fluid to enter into said at least one cross-flow header.

34. (Original) The apparatus of Claim 32, wherein said means for enabling a flow of fluid comprises at least one of a pump, a fan, and an impeller.

35. (Original) The apparatus of Claim 32, wherein said means for thermally treating a fluid comprises a chiller for condensing a condensable material to remove the condensable material from the untreated fluid.

36. (Original) The apparatus of Claim 32, wherein said means for thermally treating a fluid comprises a heater for deactivating at least one of a biological contaminant and a chemical contaminant contained within said untreated fluid.

37. (Original) The apparatus of Claim 36, wherein said heater comprises at least one electric resistive element.

38. (Original) The apparatus of Claim 36, further comprising a catalytic treatment zone disposed adjacent to said thermal treatment zone and to one of each of said plurality of untreated fluid

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channels and each of said plurality of treated fluid channels, so that heat provided by said thermal treatment zone facilitates a catalytic reaction in said catalytic treatment zone.

39. (Original) The apparatus of Claim 36, further comprising an acid gas-absorbent material disposed in said treated fluid channel, such that any acid gas generated in said thermal treatment zone is removed from the treated fluid when that treated fluid passes through said acid gas-absorbent material.

40. (Original) The apparatus of Claim 32, wherein said untreated fluid comprises air.

41. (Original) The apparatus of Claim 32, wherein said sheets are one of quadrilateral in shape, and substantially round in shape.

42. (Original) The apparatus of Claim 32, wherein said at least one cross-flow header comprises a half tube.

43. (Original) The apparatus of Claim 32, wherein said at least one orifice in each sheet is disposed proximate one of a center of each sheet, and a center axis of each sheet.

44. (Original) The apparatus of Claim 32, wherein said sheets comprise a metal foil.

45. (Original) The apparatus of Claim 32, further comprising an insulated housing that substantially encloses said stacked plate heat exchanger and said thermal treatment zone.

46. (Original) The apparatus of Claim 32, wherein said sheets comprise surface features that extend outwardly of a planar surface of the sheets and separate adjacent sheets, thereby aiding in maintaining said gap between adjacent sheets.

47. (Original) The apparatus of Claim 46, wherein said surface features comprise a plurality of dimples formed into each sheet, such that a height of each dimple substantially equals a thickness of said gap.

48. (Original) The apparatus of Claim 32, wherein said sheets include surface features that stiffen each sheet.

49. (Original) The apparatus of Claim 48, wherein said surface features comprise at least one of a plurality of ribs extending substantially perpendicular to a direction of a flow of fluid in said apparatus, and a plurality of ribs extending substantially parallel to a direction of a flow of fluid in said apparatus.

50. (Original) Apparatus for thermally treating a fluid, including an integrated heat exchanger and thermal treatment zone that substantially reduces energy required to thermally treat a fluid,

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eliminates a need for seals and a header for connecting a heat exchanger section with a thermal treatment section, and has at least one of a header-less fluid inlet and a header-less fluid outlet, thereby eliminating a need for both a fluid inlet header and a fluid outlet header, comprising:

(a) a heat exchanger, comprising:

(i) a plurality of metal foil sheets stacked together in spaced-apart layers so that a gap is defined between adjacent metal foil sheets, each gap comprising one of an untreated fluid channel and a treated fluid channel, untreated fluid channels alternating with treated fluid channels, each metal foil sheet having a thickness that enables thermal energy to be readily exchanged between adjacent untreated and treated fluid channels and including at least one orifice, orifices in adjacent metal foil sheets being aligned;

(ii) at least one fluid inlet in fluid communication with each untreated fluid channel and a volume of untreated fluid; and

(iii) at least one fluid outlet in fluid communication with each treated fluid channel and a volume into which a treated fluid is discharged;

(b) at least one thermal treatment unit integrated into said heat exchanger, disposed within the orifices of the metal foil sheets;

(c) a plurality of insulated panels at least partially enclosing the heat exchanger, such that at least an upper surface and a lower surface of the heat exchanger are insulated, and such that at least one surface of the heat exchanger is in fluid communication with one of a volume of untreated fluid, and a volume into which a treated fluid is discharged;

(d) means for driving a fluid through said heat exchanger, said means being in fluid communication with one of each untreated fluid channel and each treated fluid channel, and with one of the volume of untreated fluid, and the volume into which a treated fluid is discharged; and

(e) a header system in fluid communication with said means for driving, and with only one of each untreated fluid channel and each treated fluid channel.

Claims 51-69 (Previously Cancelled)

Please add new Claim 70 as follows:

70. (New) An integrated thermal treatment system for treating a fluid, comprising:

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(a) a plurality of untreated fluid channels that convey an untreated fluid into the thermal treatment system;

(b) a plurality of treated fluid channels that convey a treated fluid out from the thermal treatment system and which are disposed in an alternating relationship with the plurality of untreated fluid channels, such that thermal energy is readily exchanged between the untreated fluid flowing within said plurality of untreated fluid channels and the treated fluid flowing within said plurality of treated fluid channels;

(c) at least one fluid inlet in fluid communication with said plurality of untreated fluid channels;

(d) at least one fluid outlet in fluid communication with said plurality of treated fluid channels; and

(e) a stacked plate heat exchanger portion comprising:

(i) a plurality of sheets stacked together and separated so that a gap is defined between adjacent sheets, each gap comprising one of said plurality of untreated fluid channels and said plurality of treated fluid channels, such that successive gaps comprise alternating untreated fluid channels and treated fluid channels; and

(ii) a thermal treatment zone disposed within the stacked plate heat exchanger, said thermal treatment zone comprising means for thermally treating a fluid, said thermal treatment zone being in fluid communication with each untreated fluid channel and with each treated fluid channel, such that each portion of the plurality of treated fluid channels closest to the thermal treatment zone is equidistant to each portion of the plurality of untreated fluid channels closest to the thermal treatment zone.

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